WE CLAIM:

1. A channel power control device, comprising:

a first multiple channel port;

a second multiple channel port;

a dispersion region where individual optical channels propagating from the first optical multiple channel port are spaced apart;

a diffraction unit disposed between the first multiple channel port and the dispersion region, the diffraction unit defining wavelength-specific optical paths between the first multiple channel port and respective single channel ports of the plurality of single channel ports, the diffraction unit including at least first and second transmissive diffraction elements; and

a plurality of reflectors in the dispersion region disposed to reflect respective individual optical channels from the first multiple channel port to the second multiple channel port.

2. A device as recited in claim 1, further comprising a first light focusing unit disposed on the plurality of wavelength-specific optical paths between the first multiple channel port and the diffraction unit.

3. A device as recited in claim 2, wherein the first light focusing unit substantially collimates light propagating from the first multiple channel port towards the plurality of single channel ports.

4. A device as recited in claim 1, further comprising a second light focusing unit disposed on the wavelength-specific optical paths between the diffraction unit and the plurality of reflectors.

5. A device as recited in claim 1, further comprising a third light focusing unit disposed between the diffraction unit and the second multiple channel port to focus a multiple channel signal from the diffraction unit to the second multiple channel port.

6. A device as recited in claim 1, further comprising a polarization separation unit disposed between the first multiple channel port and the diffraction unit to separate light entering the device from the first multiple channel port into first and second components having mutually orthogonal polarizations.

7. A device as recited in claim 6, wherein the polarization separation unit includes a polarization rotator disposed on a path of at least one of the components to rotate polarization of the at least one of the components so as to parallelize polarization directions of the first and second components.

8. A device as recited in claim 1, further comprising a multiple channel waveguide coupled to the first multiple channel port.

9. A device as recited in claim 1, wherein the reflectors have fixed values of reflectivity selected so as to impose a desired reflectivity profile across multiple channels received from the first multiple channel port.

10. A device as recited in claim 9, wherein the plurality of reflectors includes different reflecting regions on a reflecting unit.

11. A device as recited in claim 10, wherein the reflecting unit includes a substrate having a reflecting surface and an absorbing layer disposed over the reflecting surface.

12. A device as recited in claim 11, wherein the absorbing layer has different values of thickness at different reflecting regions of the reflecting unit.

13. A device as recited in claim 1, further comprising a dynamically adjustable attenuator disposed between the diffraction unit and one of the first and second multiple channel ports.

14. A device as recited in claim 1, wherein at least one reflector of the plurality of reflectors has a dynamically adjustable reflectivity.

15. A device as recited in claim 14, wherein the at least one reflector having a dynamically adjustable reflectivity is coupled to receive reflectivity control signals from a controller.

16. A device as recited in claim 14, wherein the at least one reflector having a dynamically adjustable reflectivity includes a mirror surface and a polarizer separated from the mirror surface, a liquid crystal layer being disposed between the polarizer and the mirror surface, a value of polarization rotation imposed by the liquid crystal layer on light entering the liquid crystal layer being adjustable.

17. A device as recited in claim 16, wherein the device further includes a polarization separation unit disposed between the first multiple channel port and the diffraction unit to separate light entering the device from the first multiple channel port into first and second components having mutually orthogonal polarizations and a polarization rotator to rotate polarization states of at least one of the first and second components so that the polarization directions of the first and second components are parallel to a first polarization direction and the polarizer has a pass polarization direction that is parallel to the first polarization direction.

18. An optical communications system, comprising:

an optical transmitter, the optical transmitter transmitting a multiple channel communications signal;

an optical receiver to detect optical signals carried in multiple optical channels;

a fiber-optic communications link coupled to transport the multiple channel communications signal from the optical transmitter to the optical receiver;

wherein one of the optical transmitter, the optical receiver and the fiber-optic communications link includes a multiple wavelength device having

a first multiple channel port;

a second multiple channel port;

a dispersion region where individual optical channels propagating from the first optical multiple channel port are spaced apart;

a diffraction unit disposed between the first multiple channel port and the dispersion region, the diffraction unit defining wavelength-specific optical paths between the first multiple channel port and respective single channel ports of the plurality of single channel ports, the diffraction unit including at least first and second transmissive diffraction elements; and

a plurality of reflectors in the dispersion region disposed to reflect respective individual optical channels from the first multiple channel port to the second multiple channel port.

19. A system as recited in claim 18, further comprising a fiber amplifier unit disposed along the fiber-optic communications link, wherein the first multiple channel port is coupled to the fiber-optic communications link to

receive light amplified in the fiber amplifier unit and the second multiple channel port is coupled to return light to the fiber-optic communications link.

20. A system as recited in claim 19, wherein the fiber amplifier unit amplifies different channels in the multiple channel communications signal by different amounts to produce a non-uniform channel power profile, reflectivities of the plurality of reflectors being selected to reduce non-uniformities in the channel power profile.

21. A system as recited in claim 20, further comprising a channel monitor disposed to detect to at least a portion of the multiple channel communications signal after being returned to the fiber optic communications link from the second multiple channel port.

22. A system as recited in claim 21, wherein reflectivities of the plurality of reflectors are dynamically adjustable under control of a control unit and the channel monitor is coupled to the control unit to provide channel power profile information to the control unit.

23. A system as recited in claim 22, wherein the control unit further adjusts at least one of pump laser power and pump laser wavelength of the fiber amplifier unit in response to the channel power profile information.

24. A method of adjusting a power profile of a multiple channel communications signal, comprising:

diffracting the multiple channel communications signal with a first transmission diffraction element;

diffracting light from the first transmission diffracting element with a second transmission diffraction element;

focusing light from the second transmission diffraction element so as to separate individual channel beams at respective reflectors;

reflecting the individual channel beams with respective reflectors having selected values of reflectivity;

diffracting light reflected from the reflectors with the second and first transmission diffraction elements to produce a multiple channel output signal.

25. A method as recited in claim 24, further comprising collimating the multiple channel communications signal before diffracting the multiple channel communications signal with the first transmission diffraction element.

26. A method as recited in claim 24, further comprising separating first and second components of the multiple channel communications signal having orthogonal polarization states before diffracting the multiple channel communications signal with the first transmission diffraction element.

27. A method as recited in claim 26, further comprising rotating polarization direction of at least one of the components so that the components propagate to the first transmission diffracting element with parallel polarization directions.

28. A method as recited in claim 24, further comprising directing the multiple channel communications signal towards the first transmission diffraction element with a multiple channel waveguide.

29. A method as recited in claim 24, further comprising attenuating one of the multiple channel communications signal and the multiple channel output signal.

30. A method as recited in claim 24, further comprising adjusting reflectivity values of the reflectors individually.

31. A method as recited in claim 30, further comprising amplifying the multiple channel communications signal before diffracting the multiple channel communications signal with the first transmission diffraction element, monitoring a multiple channel profile produced by light from the multiple channel output signal, and generating a channel profile signal.

32. A method as recited in claim 31, further comprising adjusting reflectivity of at least one of the reflectors in response to the channel profile signal.

33. A device for controlling a multiple channel communications signal, comprising:

means for diffracting the multiple channel communications signal with a first transmission diffraction element;

means for diffracting light from the first transmission diffracting element with a second transmission diffraction element; and

reflector means for reflecting the individual channel beams with respective reflectors having selected values of reflectivity;

means for focusing light from the second transmission diffraction element so as to separate individual channel beams at respective reflector means;

diffracting light reflected from the reflector means with the second and first transmission diffraction elements to produce a multiple channel output signal.